CMGS-1
Color Mini-Ganzfeld System

USER'S MANUAL

Version 2.3

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WARRANTY

LKC Technologies, Inc. unconditionally warrants this instrument to be free from defects in materials and workmanship, provided there is no evidence of abuse or attempted repairs without authorization from LKC Technologies, Inc. This Warranty is binding for one year from date of initial delivery and is limited to: servicing and/or replacing any instrument, or part thereof, returned to the factory for that purpose with transportation charges prepaid and which are found to be defective. This Warranty is made expressly in lieu of all other liabilities and obligations on the part of LKC Technologies, Inc.

DAMAGE UPON ARRIVAL. Each instrument leaves our plant, after rigorous tests, in perfect operating condition. The instrument may receive rough handling and damage in transit. The shipment is insured against such damage. The Buyer must report, in writing, immediately any concealed or apparent damage to the last carrier. Report any damage also to us, and issue an order for replacement or repair.

DEFECTS OCCURRING WITHIN WARRANTY PERIOD. Parts of units may develop defects which no amount of initial testing will reveal. The price of our instruments makes provision for such service, but it does not:

1. Provide for transportation charges to our factory for service,
2. Provide for services not performed or authorized by us,
3. Provide for the cost of repairing instruments that have obviously been abused or subjected to unusual environments for which they have not been designed.

We will be happy at any time to discuss by phone, letter, FAX, or e-mail suspected defects or aspects of instrument operation that may be unclear. We advise you to inform us by phone, letter FAX, or e-mail of the nature of the defect before returning an instrument for repair. Often, a simple suggestion will solve the problem without returning an instrument to the factory. If we are unable to suggest something that solves the problem, we will advise you as to what parts of the equipment should be returned to the factory for service.

DEFECTS OCCURRING AFTER WARRANTY PERIOD. Charges for repairs after the warranty period will be based upon actual hours spent on the repair at the then prevailing rate, plus cost of parts required and transportation charges, or you may elect to purchase an extended warranty.

We will be happy to discuss by phone, letter, FAX, or e-mail any problem you may be experiencing.

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Important Notice

The CMGS-1 Mini-Ganzfeld System is approved for human use by the US Food and Drug Administration (FDA) only when used with an LKC Technologies UTAS or EPIC visual electrodiagnostic test system, or when sold by another manufacturer as part of their complete system. This notice does not affect use of the device on animals.

Introduction

The CMGS-1 is a stand-alone monocular ganzfeld photic stimulator designed for use in visual electrodiagnostic testing. The stimulator conforms to the requirements of the ISCEV *Standard for Clinical Electroretinography*. The CMGS-1 is designed to be used with an electrophysiology recording system to perform the electroretinogram (ERG) or flash visually evoked potential (flash VEP).

The equipment has been tested in accordance with IEC60601-1 and meets all requirements for Non-isolated Patient Connections, i.e., electromedical apparatus with intentional electrical or conductive contact, other than contacts intended to be connected to the exposed heart or to a foreign conductive pathway to the heart or great vessels.

Setting up the CMGS-1

Before you can use the CMGS-1, you must set it up, connect it to your recording system, and configure it to match your recording system.

The CMGS-1 system consists of two parts:

- The Main Unit (the box)
- The Hand held Color Mini-Ganzfeld Stimulator (called the Kürbisfeld)

Step 1

Make sure the CMGS-1 is properly configured to match your recording system. See the section titled ***Configuring the CMGS-1 to Match Your System*** on the next page. If you have trouble figuring this out, call, fax, or e-mail customer support at LKC for assistance.

Step 2

Plug the Kürbisfeld into the Main Unit.

☞ **Make sure the power to the Main Unit is off before connecting or disconnecting the Kürbisfeld.**

Step 3

Plug the Main Unit into the power mains. If you are using the CMGS-1 with an LKC EPIC or UTAS system, plug the unit into one of the outlets on the back of the Interface Unit. If you are using the CMGS-1 with a system from another manufacturer, you may plug the CMGS-1 directly into a wall outlet.

☞ **The CMGS-1 uses a "Universal" power supply. As such, it can be connected to any AC power source from 100 Volts to 220 Volts at either 50 or 60 Hz.**

Step 4

Connect the CMGS-1 to your recording system using the cable provided with the unit. See the instructions in ***Configuring the CMGS-1 to Match Your System*** on the next page to determine how to connect the cable.

☞ **You are now ready to use your CMGS-1 stimulator.**

Configuring the CMGS-1 to Match Your System

To function properly as a stimulator, the CMGS-1 must communicate with your recording system. The CMGS-1 can do this in one of two ways:

- The CMGS-1 can accept a trigger signal from your recording equipment and trigger its stimulus from this signal.

- The CMGS-1 can provide a trigger signal to your system to inform it that the stimulus has been triggered by pressing the **STIM** button either on the Main Unit or on the stimulator.

☞ **The first step in configuring the CMGS-1 is to decide whether the recording system or the CMGS-1 will trigger the stimulus.**

If the CMGS-1 is to accept a trigger signal from your recording system:

- Connect a cable from the trigger output of your recording system to the connector marked **TRIGGER IN** on the rear of the CMGS-1.

You must also make sure that the CMGS-1 is set to properly trigger from your recording system. The CMGS-1 accepts a TTL-level (0 to 5 V) trigger input signal. As it comes from the factory, the CMGS-1 will fire stimulus each time the trigger input signal, applied to TRIGGER IN, goes from **low** (0 V) to **high** (5 V). Consult the manual for your recording system or measure its trigger signal with an oscilloscope to determine its polarity.

Warning: If the Trigger In Polarity Switch is improperly set, the CMGS-1 may appear to operate correctly, but the timing of the stimulus will be incorrect.

If the trigger signal from your system goes from **high** (5 V) to **low** (0 V), set the trigger-in-polarity switch SW9-3 on PCB 310134 to the **on** position.

If the CMGS-1 is to provide a trigger signal to your recording system:

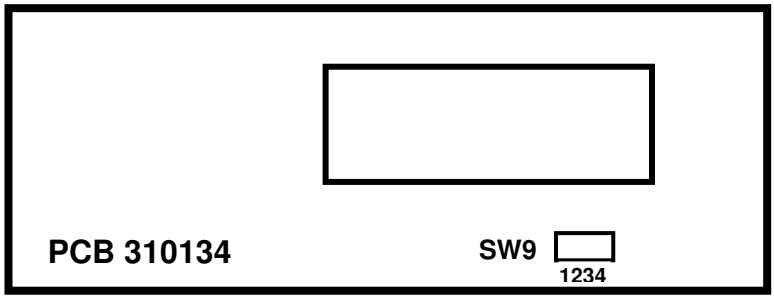
- Connect a cable from the connector marked **TRIGGER OUT** on the rear of the CMGS-1 to the external trigger input of your recording system.

You must also make sure that the CMGS-1 is set to send the proper trigger to your recording system. As it comes from the factory, the CMGS-1 sends a TTL-level trigger signal to TRIGGER OUT that goes from **low** (0 V) to **high** (5 V) to the recording system each time a stimulus occurs. Consult the manual for your system to determine if this is the correct polarity.

Warning: If the Trigger Out Polarity Switch is improperly set, the CMGS-1 may appear to operate correctly, but the timing of the stimulus will be incorrect.

If your system requires a trigger signal going from **high** (5 V) to **low** (0 V), set the trigger-out-polarity switch SW9-2 on PCB 310134 to the **on** position.

Setting the CMGS-1 switches.



Remove the four screws on the bottom of the CMGS-1 box and lift off the top cover.

The rocker DIP switch SW9 is located on the circuit board PCB 310134 mounted to the back of the front panel. You will need to slide the front panel out of the bottom cover to gain access to the switch. Turn on or turn off switches of SW9 according to the following tables.

SW9-1, Trigger Out Select Switch	
ON*	**TTL - level** trigger output signal
OFF	**Open - Collector** trigger output signal

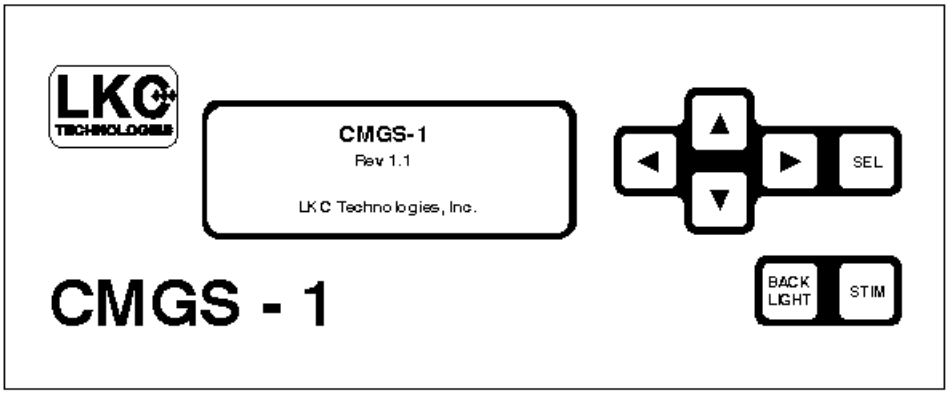
SW9-2, Trigger Out Polarity Switch	
ON	Trigger output goes **high** to **low** at stimulus
OFF*	Trigger output goes **low** to **high** at stimulus

SW9-3, Trigger In Polarity Switch	
ON	Stimulus triggers on **high** to **low** transition
OFF*	Stimulus triggers on **low** to **high** transition

* System default settings.

Using the CMGS-1

After you have properly set up your CMGS-1, you are ready to start using it.



Turning it On and Off

The power switch for the CMGS-1 is located on the rear of the unit. It's the only switch on the Main Unit that isn't labeled. When you turn the CMGS-1 on, the LCD display window on the Main Unit will glow with green light and show the information as above, and the 7 push buttons will turn red. Whether the fixation light in the Kürbisfeld glows a dim red or remains off depends on the last setting before the system was previously powered off.

After 3 seconds, the LCD display will turn to the **Main Menu**.

Main Menu

The **Main Menu** displays function names (also sub-menu names) and the current settings of flash/flicker color, flash/flicker intensity, back light color and back light brightness:

Main Menu
➡ Flash Background
Flicker Off Response
B:W 30cd/m^2 F:W 0dB

CMGS-1 can save all the settings in its memory. Each time when the system is powered on, the **Main Menu** will show the last settings before it was powered off. The first time you power your CMGS-1, the default settings of the system should be shown as above, which means:

Stimulus Type:	Flash
Background Light:	White, 30cd/m^2
Flash/Flicker:	White, 0dB (2.5cd·s/m^2)

Pressing the **BACK LIGHT** button on the front panel or the **BKLT** button on the back of the Kürbisfeld will turn on the background light.

The background light can be White, Red, Green or Blue. Each color has 3 brightness levels: 15, 30 and 60 cd/m^2. All the features can be selected in the **Background** sub-menu.

Pressing the **STIM** button either on the front panel or on the back of the Kürbisfeld will trigger the stimulus. At the same time, the system will send a trigger output pulse to the **TRIGGER OUT** BNC connector on the rear panel, *except for Off-Response stimuli, in which the trigger out will occur when the light turns off.*

☞ **The STIM and BACK LIGHT buttons are operational only when the Main Menu is displayed.**

CMGS-1 provides 3 kinds of stimuli: Flash, Flicker and Off-Response. The features of each stimulus can be set in the according sub-menu. Red, Green, Blue or White flash/flicker/off-response stimulus of any available intensity can be triggered individually or with any color, any level background light.

When the **STIM** button is pressed, it will

- fire a single flash if the cursor arrow points to **Flash** or **Background**.
- start flicker until the **STIM** button is released if the arrow points to **Flicker**.
- turn on the Off-Response Light if **Off Response** is pointed to on the screen. The Light will remain on for the duration specified by the **Off Response** sub-menu.

☞ **If the CMGS-1 is set to accept a trigger signal from your recording system, make sure to position the arrow pointer to the right function before the stimulus is triggered. External trigger input signals can be accepted by the CMGS-1 only at the Main Menu.**

- To trigger Flashes, position the pointer to either **Flash, Flicker** or **Background**.
- To trigger Off Response, position the pointer to **Off Response**.

Use buttons ▲ ▼ ← and → to select functions/sub-menus. Press the **SEL** button to switch to the according sub-menu. Features for any function, e.g., color, intensity, etc. can be re-selected in the sub-menus.

Flash Menu

Flash
Color: ✻W R G B
Intensity: ✻ 0dB

The Color/Intensity features with the ✻ symbols are the current settings. Use buttons ▲ and ▼ to toggle color and intensity. Press button ← or → to change either color or intensity. Once button ← or → is pressed, the symbol ✻ will turn to a pointer ➡, which indicates that no option for the feature is selected yet. Press the **SEL** button to select an option. After both color and intensity are selected, press **SEL** again to return to the **Main Menu**.

There are 4 colors selectable: White, Red, Green and Blue.
Intensities for each color are: White: -25 through +10dB in 5dB steps.
R/G/B: -25 through 0dB in 5dB steps, and +2dB.
(0 dB = 2.5 cd·s/m^2)

Flicker Menu

Flicker
Color: ✻W R G B
Intensity: ✻ 0dB
Flicker Rate: ✻ 30Hz

The Color/Intensity/Flicker Rate features with the ✻ symbols are the current settings. Use buttons ▲ and ▼ to point to any of the three features. Press button ← or → to make a change to the feature. Once button ← or → is pressed, the symbol ✻ will turn to a pointer ➡, which indicates that no option for the feature is selected yet. Press the **SEL** button to select an option. After all three features are selected, press **SEL** again to return to the **Main Menu**.

Flicker Color:	White, Red, Green or Blue.
Flicker Intensity:	White: -25 through +10 dB in 5dB steps. R/G/B: -25 through 0 dB in 5dB steps, and +2dB.
Flicker Rate:	5Hz through 60Hz in 5Hz steps.

Off Response Menu

Off Response
Color: ✻W R G B
Int.: 300 ✻1000 cd/m
On Time: ✻ 5000 ms

The Color/Intensity/On Time features with the ✻ symbols are the current settings. Use buttons ▲ and ▼ to point to any of the three features. Press button ← or → to make a change to the feature. Once button ← or → is pressed, the symbol ✻ will turn to a pointer ➡, which indicates that no option for the feature is selected yet. Press the **SEL** button to select an option. After all three features are selected, press **SEL** again to return to the **Main Menu**.

Light Color:	White, Red, Green or Blue.
Light Brightness:	White: 300cd/m^2, 1000cd/m^2.
	R/G/B: 300cd/m^2.
Light-On Time:	100ms through 5000ms in 100ms steps.

Background Menu

Background
Color: ✻W R G B
Int.: 15 ✻30 60 cd/m
Fixation: ✻ON OFF

The Color/Intensity/Fixation features with the ✻ symbols are the current settings. Use buttons ▲ and ▼ to point to any of the three features. Press button ← or → to make a change to the feature. Once button ← or → is pressed, the symbol ✻ will turn to a pointer ➡, which indicates that no option for the feature is selected yet. Press the **SEL** button to select an option. After all three features are selected, press **SEL** again to return to the **Main Menu**.

Back Light Color:	White, Red, Green or Blue.
Back Light Brightness:	15, 30 or 60cd/m^2 for any of W/R/G/B.
Fixation Light:	On or Off

Computer Control

As an additional option CMGS-1 can also be controlled by a PC via its RS-232 serial port. If you need to use this feature, please contact LKC for further information on how to purchase this option.

Presenting Stimuli to the Patient

To present a stimulus to the patient, hold the Kürbisfeld up to the patient's eye.

- The ERG requires a ganzfeld stimulus, and the Kürbisfeld must be close to the patient's eye to assure that light enters the eye evenly from all directions. Be careful that the Kürbisfeld does not dislodge the corneal electrode when it is placed over the eye.

- The flash VEP does not require a ganzfeld stimulus, and the Kürbisfeld may be held up to 10 cm (4 inches) from the patient's eye.

☞ **Press the STIM button on the Kürbisfeld to present a stimulus to the patient.**

If the Main Unit is set to **Flash**, a single flash of the selected color and selected intensity will be presented. If the Main Unit is set to **Flicker**, a flickering stimulus will be presented until the **STIM** button is released.[1]

CMGS-1 Cleaning and Maintenance

The outer plastic surfaces of the CMGS-1 system may be cleaned with a damp cloth and any mild detergent. The inner surface of the Ganzfeld globe must not be touched or wiped by any material because of the fragility of the reflective coating. It is highly recommended that the Ganzfeld be protected with the supplied cover any time it is not in use. Use low-pressure filtered compressed air only to remove any dirt or dust that may have accumulated inside the globe. If the reflective coating becomes damaged, the Ganzfeld must be returned to LKC Technologies for refinishing.

[1] The Main Unit will send a pulse to the Trigger Out connector for each flash during this period.